

CLAIMS

What is claimed is:

- 5 1. A retractable ramp system comprising:
- a ramp platform;
- a ramp carriage assembly for moving said ramp platform;
- a motor;
- a motor drive shaft;
- 10 a drive pulley upon said motor drive shaft;
- a belt in direct communication with said drive pulley and said ramp carriage assembly; and
- a mechanical motor release assembly.
- 15 2. The retractable ramp system of claim 1 wherein said mechanical motor release assembly comprises:
- a release cable; and
- a release actuator in communication with an end of said release cable, said release actuator for engaging and disengaging said drive pulley from said
- 20 motor.
3. The retractable ramp system of claim 2 further comprising a sliding collar mounted upon said motor drive shaft, said sliding collar engaged with said release actuator, said sliding collar comprising at least one pin extending from said collar for
- 25 engaging said drive pulley.
4. The retractable ramp system of claim 2 wherein said release actuator comprises a first end and an opposite end, said first end pivotable about a point and said opposite end engaged with said sliding collar.

5. The retractable ramp system of claim 3 further comprising a keyed collar mounted upon said motor drive shaft between said sliding collar and said drive pulley.

5 6. The retractable ramp system of claim 5 wherein said keyed collar defines at least one opening for the passage of said pin of said sliding collar.

7. The retractable ramp system of claim 3 wherein said drive pulley defines at least one opening for the insertion of said pin of said sliding collar.

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8. The retractable ramp system of claim 3 further comprising:
a stop collar mounted upon said motor drive shaft; and
a spring upon said motor drive shaft between said stop collar and said sliding collar.

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9. The retractable ramp system of claim 1 further comprising a manual control assembly comprising:

a manual control bearing block in communication with said ramp carriage assembly;

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a manual control cable in communication with said manual control bearing block; and

a crank in communication with said manual control cable.

10. The retractable ramp system of claim 9 wherein said crank comprises:

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a crank handle; and

a manual control pulley in communication with said crank handle and said manual control cable.

11. The retractable ramp system of claim 10 further comprising:

a shaft comprising a first end and a second end, said first end of said shaft inserted into said crank handle; and

a one-way bearing inserted into said second end of said shaft, said
5 second end of said shaft in communication with said manual control pulley.

12. The retractable ramp system of claim 1 wherein said ramp carriage assembly comprises:

guide shafts;

10 linear bearings translational along said guide shafts; and

pivot arms attached to said linear bearings, said pivot arms pivotably attached to said ramp platform.

13. The retractable ramp system of claim 12 further comprising:

15 a member extending orthogonally between said pivot arms; and
a torsion bar extending orthogonally between said pivot arms.

14. The retractable ramp system of claim 13 further comprising a torsion spring for preloading said torsion bar.

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15. The retractable ramp system of claim 14 further comprising a bar extending between said torsion bar and an end of said ramp platform for providing a downward force against an end of said ramp platform.

25 16. The retractable ramp system of claim 1 further comprising:

a ramp flap;

a ramp flap hinge in communication with said ramp flap;

at least one ramp flap wheel affixed to an underside of said ramp flap, said wheel translational upon said ramp platform.

17. The retractable ramp system of claim 16 further comprising a ramp flap actuator bracket affixed to one of said at least one ramp flap wheel, said bracket providing a force against said ramp flap upon a movement of said ramp platform.

5 18. The retractable ramp system of claim 16 wherein said ramp platform comprises a ramp platform side lip comprising a height approximately equal to the height of said ramp flap wheel.

10 19. The retractable ramp system of claim 17 wherein said ramp platform defines a cutout through which said at least one ramp flap wheel drops upon deployment of said ramp platform.

20. The retractable ramp system of claim 1 wherein said carriage assembly comprises a profile approximately equal to the profile of said ramp platform.

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21. A method of operating a retractable ramp system, the method comprising:
 providing a ramp platform;
 moving the ramp platform with a ramp carriage assembly;
 powering the ramp platform with a motor having a motor drive shaft;
 20 providing a drive pulley upon the motor drive shaft;
 moving the ramp carriage assembly with a belt in direct
 communication with the drive pulley and ramp carriage assembly; and
 mechanically disengaging and engaging the drive pulley from the
 motor with a mechanical motor release assembly.

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22. The method of claim 21 wherein the step of mechanically disengaging and engaging the drive pulley from the motor with a mechanical motor release assembly comprises disengaging the motor from the drive pulley with a release actuator.

23. The method of claim 22 wherein the step of disengaging the motor from the drive pulley with a release actuator comprises pulling on the release actuator with a release cable.

5 24. The method of claim 23 wherein the step of pulling on the release actuator with a release cable comprises pivoting an end of the release actuator about a pivot point.

10 25. The method of claim 23 wherein the step of pulling on the release actuator with a release cable comprises translating a sliding collar along the motor drive shaft with the release actuator.

15 26. The method of claim 25 further comprising providing at least one pin extending from the sliding collar, said pin for engaging with and disengaging from the drive pulley.

27. The method of claim 26 further comprising providing a keyed collar mounted upon the motor drive shaft between the sliding collar and drive pulley.

20 28. The method of claim 27 further comprising passing a pin of the sliding collar through an opening defined in the keyed collar.

25 29. The method of claim 28 further comprising removing a pin of the sliding collar from an opening defined in the drive pulley to disengage the drive pulley from the motor.

30. The method of claim 29 further comprising spring-loading the sliding collar with a spring force opposing the pulling force applied to the release actuator.

31. The method of claim 30 further comprising engaging the drive pulley with the motor by inserting a pin of the sliding collar through an opening defined in the drive pulley with the spring force exerted on the sliding collar.

5 32. The method of claim 21 further comprising manually controlling the ramp system when the drive pulley is disengaged from the motor.

33. The method of claim 32 wherein the step of manually controlling the ramp system when the drive pulley is disengaged from the motor comprises:

10 providing a manual control bearing block in communication with the ramp carriage assembly; and

 translating the ramp carriage assembly with the manual control bearing block by moving the manual control bearing block with a manual control cable in communication with the manual control bearing block.

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34. The method of claim 33 wherein the step of moving the manual control bearing block with a manual control cable comprises:

 turning a crank handle; and

 taking up the manual control cable onto a manual control pulley

20 controlled by the crank handle.

35. The method of claim 34 further comprising allowing the manual control pulley to rotate only in a single direction.

25 36. The method of claim 21 wherein the step of moving the ramp platform with a ramp carriage assembly comprises:

 providing pivot arms pivotably attached to the ramp platform;

 providing linear bearings attached to the pivot arms; and

 translating the linear bearings along guide shafts.

37. The method of claim 36 further comprising:
 providing a member extending orthogonally between the pivot
 arms; and
 providing a torsion bar extending orthogonally between the pivot
 5 arms.

38. The method of claim 37 further comprising preloading the torsion bar with
 a torsion spring.

10 39. The method of claim 38 further comprising providing a downward force
 against an end of the ramp platform with a bar extending between the torsion bar and
 an end of the ramp platform.

15 40. The method of claim 21 further comprising:
 providing a ramp flap;
 rotating the ramp flap with a ramp flap hinge;
 providing at least one ramp flap wheel affixed to an underside of
 the ramp flap; and
 translating a ramp flap wheel upon the ramp platform.

20 41. The method of claim 40 further comprising providing a force against the
 ramp flap upon a movement of the ramp platform with a ramp flap actuator bracket
 affixed to one of the ramp flap wheels.

25 42. The method of claim 40 further comprising dropping a ramp flap wheel
 into a cutout defined in the ramp platform upon a movement of the ramp platform.

43. A method of deploying a retractable ramp system, the method comprising:

rotating a motor shaft;

rotating a drive pulley with the motor shaft;

5 moving a drive belt with the drive pulley;

deploying a ramp carriage assembly for a ramp platform with the drive belt;

pivoting the ramp platform on support bearings of the ramp carriage assembly after the ramp platform is deployed beyond a predetermined point;

10 and

dropping wheels of a ramp flap into a cutout defined in the ramp platform upon deployment of the ramp platform.

44. A method of stowing a retractable ramp system, the method comprising:

15 rotating a motor shaft;

rotating a drive pulley with the motor shaft;

moving a drive belt with the drive pulley;

stowing a ramp carriage assembly for a ramp platform with the drive belt;

20 pivoting the ramp platform on support bearings of the ramp carriage assembly;

rotating a ramp flap into a horizontal position with a force provided by brackets affixed to wheels affixed to an underside of the ramp flap; and

translating the ramp flap wheels along the ramp platform.